
Establishing Integrated Pest Management Policies and Programs: A Guide for Public Agencies

**Mary Louise Flint
University of California
Statewide Integrated Pest Management Project**

**Sheila Daar
Bio Integral Resource Center**

**Richard Molinar
University of California Cooperative Extension**

**University of California
Statewide Integrated Pest Management Project
Division of Agriculture and Natural Resources
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Pest Management Policy Committee Members. This group met to discuss initial ideas for the publication and to review subsequent drafts:

Nancy Brownfield, East Bay Regional Park District, Oakland, CA

Sheila Daar, BIRC, Berkeley, CA

Wendy Fitzgerald, Calif. Dept. Water Resources, Sacramento, CA

Mary Louise Flint, UC IPM Project, UC Davis

Charlotte Knight, Fremont Unified School District, Fremont, CA

Carey Krefft, NSTC Farmtech, San Leandro, CA

Richard Molinar, Cooperative Extension, Alameda County, CA

Dean Nissen, Fremont Unified School District, Fremont, CA

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Mary Louise Flint, Director; Margaret Brush, Production and Design

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University of California
Davis, CA 95616-8620
(916) 752-4162

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INTRODUCTION

As a result of growing concerns about health and environmental problems associated with pesticides, public agencies are facing increasing demands from their employees, their clientele, and the general public to explain and justify their use of these materials. Agencies must be able to respond with careful, thoughtful answers. Managing insects, plant pathogens, weeds, rodents, and other organisms that become pests is a complex science; applying pesticides safely and effectively in public areas requires substantial expertise and skill. Responses to the public's questions must communicate an understanding of this complexity and a genuine concern for health and environmental problems.

Adoption of a written policy and procedures for pest control decisions will provide an agency with an effective way to respond to the questioning public and at the same time improve the agency's internal decision-making process, resulting in more efficient, effective, and safe resolution of pest problems. Involving the public and employees in the development and evolution of a pest control policy can help educate everyone on the potential hazards and benefits of pest control practices.

This pamphlet evolved out of a University of California-sponsored pesticide applicators workshop for public agency pest control professionals and their supervisors held in Alameda County in November 1988. Ideas were gleaned from discussions involving pest control professionals and their supervisors from school districts, regional parks, city, county and state agencies, private pest management consultants, and University of California personnel who work with public agencies. The group was in strong agreement that public agency pest control policies should be founded on the principles of integrated pest management to assure the safest, most reliable pest control possible.

What is Integrated Pest Management?

Integrated pest management (IPM) is a pest management strategy that focuses on long-term prevention or suppression of pest problems with minimum impact on human health, the environment, and nontarget organisms. Preferred pest management techniques include encouraging naturally occurring biological control, using alternate plant species or varieties that resist pests, selecting pesticides with a lower toxicity to humans or nontarget organisms; adoption of cultivating, pruning, fertilizing, or irrigation practices that

reduce pest problems; or changing the habitat to make it incompatible with pest development. Broad spectrum pesticides are used as a last resort when careful monitoring indicates they are needed according to preestablished guidelines. When treatments are necessary, the least toxic and most target-specific pesticides are chosen. Implementing an integrated pest management program requires a thorough understanding of pests, their life histories, their environmental requirements and natural enemies as well as establishment of a regular, systematic program for surveying pests, their damage and/or other evidence of their presence.

What Will an Integrated Pest Management Policy Do for Your Agency?

Although the initial reason for developing an integrated pest management policy may be to explain and justify your agency's use or nonuse of pesticides, it will provide many other benefits. For instance, a written policy will provide procedural guidelines for the agency. There are many federal, state, and local regulations that must be followed when storing, transporting, applying, or disposing of pesticides. There are specific laws regarding who can recommend pesticides and how applicators must be trained in California. Specific safety equipment and procedures are required for the use of many pesticides. A written policy will assure that these regulations are adhered to each time a pesticide is used and help you document that proper procedures were followed.

Developing and establishing a set policy will educate applicators, administrators, other employees, and the general public about when and why pesticides are used and when alternative methods might be adopted. Employees will gain a better understanding of their jobs. An IPM policy may reduce your agency's reliance on pesticides, protect the environment, and protect applicators, coworkers, their families and the public. If problems do arise, the policy will provide procedures for immediately handling the problem and help you to document that your agency acted responsibly.

SETTING POLICY GOALS

The first step in establishing an integrated pest management policy is to determine the goals of your pest management program. Policy goals give your agency a framework on which to base individual decisions. All goals may not be met with each and every decision, but established goals will give your agency a set of priorities to work from. *Goals will vary considerably from agency to agency* according to the function of the agency, public and wildlife access to agency grounds, employee concerns, and political priorities. The overall goal for many agencies would be to "establish a more effective and safe pest management program"; however, this type of general goal is not specific enough to guide decision making. More specific goals might be divided into two categories: (1) political, educational, and public relations goals for policy makers; and (2) operational goals for basing individual pest control decisions.

Goals should be set with input from employees and the general public. Their establishment is one of the most productive ways that people without technical expertise can participate in the policy making process. Involving various factions of the community in policy development is a good way to garner widespread support for the program and policy later on. Pest management policy goals will differ with the function of agencies; examples of possible goals follow.

Examples of Political-Educational Goals

- Ensure that the public agency's governing board (supervisors, trustees, directors) are kept informed as to the progress of the IPM program. Their support and encouragement can assure the program's presence and fiscal health
- Establish procedures (e.g., through a technical review committee and periodic reevaluations) for assuring that the latest information is incorporated into pest management decisions
- Develop procedures for allowing public input without disruption of the overall program
- Make information accessible to the public and employees regarding pesticides used and areas treated
- Ensure that applicators are educated regarding current pesticides, their hazards, and applications
- Educate employees and the public about pest management problems and solutions

- Encourage employees to first consider alternatives to pesticides
- Keep citizen complaints at or below current levels through effective practices and public education

Examples of Operational Goals

- Design a written plan for implementing IPM procedures throughout the facility and for individual pests
- Develop plant inventory and pest problem survey protocols
- Establish monitoring programs and evaluative criteria to measure control success
- Maintain pests at levels that prevent them from becoming a health hazard
- Eliminate fire hazards (tall dry grass, dead trees, etc.) in a timely manner
- Reduce/eliminate all use of pesticides in CDFA category ____ (I or II or III—agency choice)
- Establish and maintain pesticide use reporting and recordkeeping
- Establish and maintain records of pest occurrence and levels at which they become a problem
- Identify and evaluate cultural/environmental conditions on the grounds that seem to encourage pest problems
- Use safer alternatives whenever economically feasible

PROCEDURES FOR DESIGNING AN IPM PROGRAM

Once policy goals are set, persons with pest management expertise within (and perhaps also outside) your agency must establish reasonable procedures for meeting these goals. At first, some operating guidelines will be crude but you can refine them with time as your experience grows. However, it is important to have established procedures so you can document and measure their success and improve them with time. The system will evolve. The procedures listed below are intentionally generic because of the great variety of pest management situations. Pest control procedures must be developed on a pest-by-pest basis. You can get help by consulting the references at the end of this publication, talking to Cooperative Extension offices, consulting private pest management consultants, or talking to other agencies with similar problems. Remember to keep your policy goals in the forefront and to regularly document and reevaluate your program. Keep up with new ideas and practices through continuing education and professional publications.

The success and sophistication of your IPM program will depend on the experience, skill, education, and enthusiasm of your employees. Take these factors into account when establishing procedures. Don't expect employees to perform new tasks without encouragement and training. You may need to bring in outside expertise to assist in the first season of a new program.

Step-by-Step Procedures for Developing an IPM Program

- 1. Identify all potential pests (including all life stages) in the system.** Verify damage symptoms associated with pests; identify natural enemies. Train all pest management personnel to accurately identify major pests and/or their damage and beneficials, and to seek help when they can't. Have materials (e.g., a field manual) and tools (e.g., a microscope) available to assist in pest identification. Make provision for identifying new pests as they are observed (see step 9).
- 2. For each pest, establish monitoring guidelines.** These may be crude at first but can be improved with experience. Monitoring methods vary from pest to pest (see references), but all involve regular (e.g., weekly) checking (visually or with traps) for pests and/or damage symptoms or other evidence of their presence (e.g., feces) and some way of quantifying observations. Also provide for monitoring of natural enemies. Overall, the objectives of a monitoring program are
 - to pinpoint precisely when and where pest problems may become intolerable;
 - to determine the effectiveness of treatment actions.

- 3. Establish injury levels and action thresholds for each individual pest species before making any treatment.**

An injury level is the pest population size (e.g., 10 aphids per leaf or 2 cockroaches per trap) that is associated with intolerable damage. Action thresholds are the set of conditions required to trigger a control action—usually a pesticide spray.

Determine the infestation levels that will be intolerable to people or to structures or will cause unacceptable damage at various times of the year, plant growth stages, situations, and so on. At the same time you must devise a monitoring plan for detecting these pest levels and determining when to treat. Over time you will refine your injury levels and action thresholds; however, treatment is usually required when

- regular monitoring program indicates that the pest population will reach the injury level if left untreated; *and*
- biological or environmental factors cannot be expected to reduce the pest problem within a reasonable time; *and*
- treatment cost and health and environmental hazards are considered less than the potential pest damage.

- 4. Establish a recordkeeping system.** Good records are essential for evaluating and improving your IPM program and for reference when the public wants to know how you handle certain types of pests. Any recordkeeping system should include observations such as

- the identification of pest (to species if possible); how identification was made;
- the size (density) of the pest infestation;
- the geographic distribution of the pest problem in managed area (a map of your facility can be useful for this);
- complete information on how you treated the problem including what, how much, where, when, who did it, cost, application difficulties;
- the effectiveness of treatment on solving the pest problem (short-term and long-term);
- the side effects of the treatment on nontarget species;
- citizen complaints or other problems that arise, also positive feedback.

5. Develop a list of acceptable management strategies for each pest. The preferred methods in an IPM program are those which *prevent* pest problems and, therefore, eliminate the need for pesticide applications in the first place. These might include modifying structures or landscaping to be less conducive to pest survival, use of pest tolerant or resistant cultivars, use of cultural practices (such as mulches or mowing and use of pruning and planting times that discourage pests) and educating the public to be more tolerant to pests. Encouragement of naturally occurring biological control can be very important; in some cases barriers, traps, or mechanical removal can be effective. Develop a list of pesticides that are effective against each pest but least disruptive to the environment—for instance, soap sprays, microbials, botanicals, oils, and synthetic pesticides with low LD-50 and short persistence. Investigate and document the potential for use of low rates, spot treatments, and other selective ways to integrate pesticides into an IPM program that is least disruptive to biological control agents and nontarget organisms.

6. Develop specific criteria for selection of pest management methods. Make these known to employees and the public. Although all criteria may not be met in every case, choices should meet the majority of the following requirements:

- least disruptive of natural controls;
- least hazardous to human health;
- least toxic to nontarget organisms;
- least damaging to the general environment;
- most likely to produce permanent reduction of the pest;
- easiest to carry out effectively;
- most cost-effective in the short- and long-term.

7. Develop guidelines to be followed each time a pesticide is used. Prepare a check list to be used each time an application is made. Important items on the check list would include

- choosing the safest material that is effective; considering label signal words, persistence, impact on nontargets, and potential chronic human health effects;
- considering the potential for treating only the most seriously infested areas (i.e., spot treatments) to allow for survival of natural enemies (this works for some insects and mites only);

- making sure the pesticide is registered in California for the situation and that you are aware of all laws regarding its use;
- making sure you have in hand a written recommendation for using the pesticide made by a licensed pest control adviser;
- studying the pesticide label;
- making sure all safety equipment and clothing is in hand;
- verifying that the person doing the application is certified and/or qualified to handle equipment and material chosen and has been adequately trained;
- after the application, monitoring the pest population to see if the treatment was effective; keeping written records;
- obtaining the Material Safety Data Sheet (MSDS) for the pesticide;
- making sure your application equipment is appropriate for the job and calibrated;
- being prepared for all emergencies; knowing who to call for help and interim measures to take before help arrives.

8. For each step along the way, designate a responsible person. These are the people (e.g., job titles) who will be responsible for making decisions, carrying out the various pest management and emergency operations described in your policy, and regularly evaluating the effectiveness of the program.

9. Develop a list of resources. Know where you can go when information is needed and know when you need to go for outside help. Include resources for pest identification, pesticide recommendations, and information about pesticides, pest management, and handling emergencies. Build a library and have employees participate in training and continuing education programs on a regular basis.

10. Consider your IPM policy a "living document" that changes as you acquire experience and new information. Establish an oversight committee including persons with toxicological and pest management expertise to assist with initial review of procedures and future changes in the policy. Review the program regularly (e.g., annually). Involve environmental organizations, worker health advocates, and other interested members of the public or employee representatives from your facility in the development and revision of the IPM policy.

BUILDING SUPPORT FOR YOUR IPM PROGRAM WITHIN AND OUTSIDE YOUR AGENCY

Once an IPM policy has been adopted by a city council, school board, or other policy making body, it falls to agency staff and/or pest control contractors to implement the policy. Change never comes easily, and there are a number of predictable obstacles within an agency—both psychological and institutional—to be overcome when initiating IPM programs. At the same time, even if the public has been involved with development of a policy, there are likely to be occasional complaints and controversies, especially as pests, pest control practices, and public concerns change.

Psychological Barriers to IPM Adoption

1. Psychological resistance to change.

The Problem: When pest control personnel are asked to make pest control decisions in a new way and to use new methods, they may feel that there is a negative implication regarding their past performance.

How to Address It: There are many factors contributing to the need to change pest management practices. Most of these factors are beyond the control of the individual pest manager; they include (1) loss of effectiveness of many pesticides because pests are developing genetic resistance; (2) increased availability of less toxic products or techniques; (3) increased requirements for documentation, licensing, certification, and continuing education; and (4) public concern about adverse health and environmental effects of pesticides. Adoption of IPM methods will enable pest control professionals to respond to these forces for change and at the same time achieve cost-effective control of pests.

2. Loss of authority.

The Problem: Adopting an IPM approach may engender fear of many kinds of loss, including loss of personal authority or supervisory authority. In the first case individuals may fear that their experience in the field will become devalued, particularly if their expertise has been in pesticide application. In the second case, supervisors may fear that the system will become more efficient and they will lose positions beneath them.

How to Address It: Actually, successful IPM implementation enhances both personal and supervisory authority. Many of the new, less toxic

pest control materials, such as pheromones, microbial and botanical pesticides, insect growth regulators, and biological controls, require the same application skills and equipment as conventional pesticides. Mastery of IPM monitoring skills enhances the professionalization of pest control and can lead to upgrading job classifications. In terms of supervisory authority, IPM programs provide managers with greater flexibility in staff assignments. For example, by emphasizing monitoring rather than prophylactic pesticide applications, staff time previously spent spraying can be redirected to other tasks, increasing overall productivity within a department.

3. Imagined difficulty in learning new technology.

The Problem: The techniques used in IPM may initially appear to require conceptual and operational skills beyond those of current staff.

How to Address It: This fear can be overcome by building staff training into the IPM implementation program and by establishing a transition period during which pest management personnel experiment with and fine-tune IPM methods.

4. Fear of IPM program failure.

The Problem: Supervisory personnel may believe that the IPM program will not work for them even though it has been successful in a nearby agency.

How to Address It: In fact, IPM programs are designed for the particular circumstances of each location. While the IPM decision-making process remains the same no matter what the pest or site, the specific tactics and products used may vary greatly from one location or circumstance to another. This flexibility usually assures an appropriate solution to the pest problem.

Institutional Barriers to IPM Adoption

1. Fear that IPM means no access to pesticides.

The Problem: Some people think IPM means never using chemical controls.

How to Address It: While IPM definitely encourages alternatives to pesticides when feasible, chemical controls are used when necessary. However, in an IPM program, pesticides that are least disruptive, most selective to specific pests,

and rapidly biodegradable are preferred over common, broad spectrum materials. For instance, the microbial insecticide *Bacillus thuringiensis*, a naturally occurring bacteria that kills only certain groups of pest insects, is an example of the type of pesticide preferred for use in IPM programs. When chemical controls are used in an IPM program, every effort is made to "spot-treat" specific areas rather than broadcast spraying.

2. Fears that IPM is more expensive than traditional pest control.

The Problem: Until agencies have experience with IPM, they expect it will cost more than their current program; this is not always the case.

How to Address It: While there are short-term start-up costs for any new technology, in the long run IPM often has proven more cost-effective than a strictly chemical control program. When possible, IPM programs substitute information gathering (monitoring) in place of other pest control activities. This can be very cost-effective. For example, by monitoring the 1100 elm trees in their city rather than prophylactically spraying them against elm leaf beetles, the City of San Rafael, California, found that only a small portion of the trees required treatment. As a result, the city saved \$1400 (including costs of monitoring) in the first year of its IPM program compared to the previous year when all trees were sprayed.

Furthermore, IPM methods emphasize reducing the source of pest problems (e.g., designing out pest habitat and food sources) rather than treating symptoms (e.g., spraying). This type of pest prevention program is more cost-effective than a continuing program of pest reduction without addressing the underlying cause of the infestation. For example, by permanently reducing habitats for rats (i.e., by filling rat holes with concrete, changing the design of garbage cans, and increasing frequency of garbage pickup), the National Park Service was able to permanently reduce rat populations in certain parks. Previous rat control programs that had relied on poison baits had not been successful despite large expenditures of labor and money.

3. Lack of in-house IPM expertise.

The Problem: Agency staff may be unfamiliar with IPM and not know where to go for information.

How to Address It: While it is true that IPM education and training resources are not as widely available as those for chemical controls alone, good resources can be found in any community. Many agencies have found it feasible to hire an IPM specialist to work as a consultant to in-house pest control staff during the initial year or two of IPM implementation, or to create an IPM coordinator position and recruit nationwide. Increasingly, cooperative extension agents, college horticultural or entomological faculty, pest control advisers, and a nationwide network of nonprofit organizations involved in pest management, sustainable agriculture, and environmental protection are able to provide IPM information and advice. Periodicals providing practical technical advice on IPM methods for specific pest problems are increasingly available. The attached list of resources and recommended reading will assist anyone attempting to implement IPM programs.

SOME FINAL HINTS FOR IMPLEMENTING AN IPM PROGRAM

The following suggestions will help overcome barriers and smooth the transition to IPM implementation.

1. **Mandate staff training in IPM.** When writing the IPM policy document, include a requirement for the continuing education of pest management personnel. Ensure that budgetary allocations are made to assist them in obtaining the information, skills, and equipment they need to carry out the policy.
2. **Start small.** Begin IPM implementation in one location (e.g., one lawn in one park; one kitchen in one school), and include short-term objectives. For example, when dealing with a number of pest problems, identify one of the pests likely to respond quickly to an IPM approach so a short-term objective can be realized. Test the IPM methods and fine-tune them. When the program is working successfully in one area, or against one pest, then expand the program.
3. **Don't change everything at once.** To the degree possible, retain communication and accountability procedures already in use. Tailor new record-keeping and reporting forms to fit existing agency formats. Recycle existing equipment to uses consistent with IPM methods rather than immediately eliminating the equipment.
4. **Share the process.** Involve all pest management personnel in the day-to-day IPM program process as early as possible so they will understand and support the program during the sometimes difficult transition period.
5. **Emphasize communication and plan for future training.** During the IPM transition period, keep all personnel informed about what is planned, what is happening now, the expected outcome, and what will happen next. Prepare written records and visual aids that will remain in the agency when persons associated with development of the IPM program are no longer there.
6. **Build in a reward system.** Identify benchmark objectives (e.g., testing of mechanical weed control methods in one park during a 3-month period; or, a 10% reduction in pesticide use in the first year). Encourage staff to achieve objectives (e.g., a letter of commendation from agency head, recognition at an awards ceremony, an article in an agency bulletin, merit pay increase, etc.).
7. **Publicize the program.** Develop good rapport with agency public relations personnel and with the local news media. Include both field and management staff at photo and interview sessions about the IPM program.
8. **Involve the community.** Form an IPM advisory committee composed of interested organizations, citizens, and pest control professionals. They can help make IPM implementation a budgetary priority in the agency, and can donate or locate resources that may not otherwise be available to the agency.

RESOURCES FOR AGENCIES DEVELOPING IPM POLICIES

General Information

County Cooperative Extension offices (Check your phone book under University of California or Cooperative Extension)

Professional organizations (PAPA, AAIE, CAPCA)

Other agencies that deal with problems similar to yours

Pest Management Consultants

The Bio Integral Resource Center (BIRC), P.O. Box 7414, Berkeley CA 94707, offers publications, periodicals, slide shows and videos on IPM for urban and landscape situations.

Periodicals

The IPM Practitioner and *The Common Sense Pest Control Quarterly*, both from BIRC, P.O. Box 7414, Berkeley, CA 94707

Books and Other Literature

A free catalog is available from the University of California Agriculture and Natural Resources Publications (6701 San Pablo Avenue, Oakland, CA 94608-1239; phone: 415-642-2431) which lists many publications of value in managing pests, including those listed below as University of California ANR Publications.

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